

Title: Study of the effect of thin film catalyst morphology on efficiency of water electrolyzer with proton conducting membrane

Author: Tomáš Hrbek

Department: Department of Surface and Plasma Science

Supervisor: prof. RNDr. Vladimír Matolín, DrSc., Department of Surface and Plasma Science

Abstract: This bachelor thesis deals with the possibility of reducing the amount of noble metals in catalytic layers of proton exchange water electrolyzer (PEM-WE). The PEM-WE is an important unit of hydrogen economy as it allows storage of excess energy from renewable sources in the form of chemical energy. In the first part, etched membrane electrolyzers were prepared and tested, membrane etching is a previously unpublished procedure leading to a reduction of the amount of catalyst. Etched membranes were studied by scanning electron microscopy and, consequently tested in real working conditions in electrolyzers. In the second part of the work; Ir and IrO₂ were compared as catalysts for PEM-WE anode. Their in-cell performance was tested directly in the electrolyzers and in controlled condition by rotating disk electrode.

Keywords: electrolyzer, magnetron sputtering, thin-layer catalyst, etched membrane PEM, Ir vs. IrO₂